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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/697,682
Filing Date: October 29, 2003
Appellant(s): SU ET AL.

Martin Sulsky
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed January 04, 2010 appealing from the Office action mailed June 09, 2009.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is incorrect. A correct statement of the status of the claims is as follows:

Claims 2 and 34 were previously amended not currently amended.

This appeal involves claims 1-8, 10-16 and 32-35.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is substantially correct. The changes are as follows: Claims 1, 4-5, 7-8, 10-14, 16 and 35 remain rejected under 35 U.S.C. 102(e) and (a) as being anticipated by Chan EY (US Patent No. 6,355,420). The same prior art was used to reject the claims under 35 U.S.C. 102(e) and (a). Appellant only indicated that claims 1, 4-5, 7-8, 10-14, 16 and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Chan (US Patent No. 6,355,420).

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. 35 U.S.C. 112, first paragraph, is hereby withdrawn in view of Appellant's persuasive argument.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,210,896	CHAN	3-2001
6,355,420	CHAN	3-2002
5,324,637	THOMPSON	6-1994

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

35 U.S.C. 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 4-5, 7-8, 10-14, 16 and 35 remain rejected under 35 U.S.C. 102(b) as being anticipated by Chan (US Patent No. 6,210,896).

3. Chan '896 teaches methods and products for analyzing polymers, and the use of molecular motors to move polymers with respect to a station such that specific signals arise from the interaction between the polymer and an agent at the station (see abstract). The reference teaches the method for analyzing polymers based on the ability to examine each unit of a polymer individually, and by examining each unit individually the type of unit and the position of the unit on the backbone of the polymer can be identified (see column 2, lines 32-38). Furthermore, the reference teaches that one aspect of linear analysis techniques involves the movement of the polymer past a station in such a manner as to cause a signal that provides information about the polymer to rise (see column 2, lines 52-55). Furthermore, the reference teaches that a method for analyzing a polymer includes the steps of exposing a plurality of individual

units of a polymer to an agent selected from the group consisting of an electromagnetic radiation source, a quenching source, and a fluorescence excitation source causing the molecular motor to move the polymer relative to the agent, and detecting signals resulting from an interaction between the units of the polymer and the agent (see column 2, lines 60-67 and column 26). Furthermore, the reference discloses that another preferred method of analysis involves the use of radioactively labeled polymers (see column 27, lines 9-10) and the analysis of the radiolabeled polymers is identical to other means of generating signals (see column 27, lines 47-48). The reference teaches that, in one embodiment, the polymer dependent impulses measured is an electromagnetic radiation signal generated, and the units are detected at the signal generation station by measuring light emission at the station, which station can be a nanochannel (see column 6, lines 5-9). The reference further teaches a method for determining the order of units of a polymer of linked units, the method steps include 1) moving the polymer linearly relative to a station using a molecular motor, 2) measuring a polymer dependent impulse generated as each of two individual units, each giving rise to a characteristic signal, pass by the station, 3) repeating steps 1 and 2, and 4) determining the order of at least the two individual units based upon the information obtained from said plurality of similar polymer (see column 5, lines 54-63). The reference further teaches that the polymer may be any type of polymer of linked units…nucleic acid or peptide (see column 3, lines 27-32). This reads on claims 1, 5, 7-8, 11-14. The reference further teaches that the labeled polymer is moved linearly relative to a station to produce a characteristic polymer dependent impulse generated

as each of the two unit labels passes by the station, and further comprising the step of determining the distance between the polymer dependent impulses as an indication of the distance between the two unit labels (see column 4, lines 35-41). This reads on claims 1, 4, 7-8 and 16. Furthermore, the reference teaches that the method is a method for determining the proximity of two unit labels of the polymer wherein the proximity of the two unit labels is the signature of said polymer dependent impulses, the identity of each unit label being indicative of the identity of at least one unit of the polymer, wherein the labeled polymer is moved relative to a station to expose the two unit labels to the station to expose the two unit labels to the station to produce a characteristic polymer dependent impulse arising from a detectable physical change in the unit label or the station, and further comprising the step of measuring the amount of time elapsed between detecting each characteristic polymer dependent impulse, the amount of time elapsed being indicative of the proximity of the two unit labels (see column 4, lines 42-54). This reads on claim 10. The reference discloses that sequence of polypeptide is determined by comparing the relative mass difference between fragments with the known masses of the amino acid residues (see column 2, lines 8-21). This reads on claim 4. Furthermore, the reference discloses that the ability to determine the distance between two units is important for determining how many units, if any, are between the two units of interest and the sequence of units serves as a blueprint for a known polymer (see column 13, lines 25-32). The reference teaches that the method is performed on a plurality of polymers, simultaneously (see column 4, lines 8-9). The reference teaches that multiple polymers can be analyzed simultaneously by

causing more than one polymer to move relative to respective signal station on respective molecular motors (see column 8, lines 64-66). Furthermore, the reference teaches that FRET analysis can be performed on a single molecule in solution or as parallel reactions on a solid planar medium, or in different solutions, such as in multi-well dishes (see column 9, lines 29-32). Furthermore, the reference discloses analysis of labeled peptide analyzed by nanochannel FRET sequencing. The sequence-specific FRET information arising from each fragment is sorted into one of two complementary strand groups, sorting allows population analysis to determine the positions of all the desired bases, and to thus generate sequence information from the sorted data (see column 21, lines 19-26). Additionally, Example 6 of the reference teaches that polymer is pulled closer to tip using dielectric forces created by applying an AC field to electrode and waveguide, i.e., metal layers, in addition to the DC field applied across wires. The AC field applied capacitively with respect to the DC field generates an inhomogeneous field in nanochannel (see column 36, lines 14-19), meeting the limitation of inner surface of the nanopores coated with a semiconductor material. As evidenced by the instant specification, "the sensor layers may comprise semiconductor material including, but not limited to, silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide, and/or metal-based compositions such as metals or metal oxides (see paragraph [0078] of instant specification US 2005/0282229 A1). In regards to claim 35, the instant specification does not define what a “sub-nanometer scale" is. Further, since the proteins, polypeptides or peptides are passing though nonochannels, it would inherently have nanometer scales. Furthermore, claim 35 does not further limit the active method

steps of claim 1. Therefore, the reference meets the limitations of claims 1, 4-5, 7-8, 10-14, 16 and 35.

> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 4-5, 7-8, 10-14, 16 and 35 remain rejected under 35 U.S.C. 102(e) as being anticipated by Chan (US Patent No. 6,355,420).

5. Chan '420 teaches methods and products for analyzing polymers, and methods for determining various other structural properties of the polymers (see abstract). The reference further teaches that the method for analyzing polymers according to the invention is based on the ability to examine each unit of a polymer individually. By examining each unit individually, the type of unit and the position of the unit on the backbone of the polymer can be identified (see column 6, lines 48-50). Further, an individual unit of the single polymer in one aspect is caused to interact with an agent such that a change, e.g., energy transfer or quenching occurs and produces a signal (see column 7, lines 1-4), and the signal is indicative of the identity of the unit (see column 7, lines 4-5). Furthermore, the reference teaches that the polymer may be any type of polymer known in the art…is selected from the group consisting of a nucleic acid and a protein (see column 8, lines 49-51). The reference discloses that the units of the polymer which interact with the agent to produce a signal are labeled and the units may

be intrinsically or extrinsically labeled, and the plurality of individual units of the polymer are exposed to at least two stations positioned in distinct regions of the channel, wherein the interaction between the units of the polymer and two stations produce at least two signals (see column 8, lines 53-67). The reference teaches that the method includes the steps of transiently moving the individual unit of the polymer relative to a station, the identity of the individual unit being unknown, detecting a signal arising from a detectable physical change in the unit or the station, and distinguishing said signal from signals arising from exposure of adjacent signal generating units of the polymer to the station as an individual unit (see column 10, lines 1-7). Furthermore, the reference discloses that when a unit of the polymer is exposed to the agent, the interaction between the two produces a signal…if each type of unit e.g., each type of amino acid is labeled with a different light emissive compound having a distinct light emissive pattern then each amino acid will interact with the agent to produce a distinct signal. By determining what each signal for each unit of the polymer is, the sequence of units can be determined (see column 27, lines 58-67 and column 28, lines 1-5). Furthermore, the reference discloses that the labeled proteins remain completely stationary in space. By direct analogy, the spatial confinement of the nanochannels should limit or eliminate the Brownian motion of the labeled DNA in nanochannel FRET sequencing. This would allow a stable and predictable passage of the DNA through the nanochannels (see column 35, lines 39-64). The instant specification discloses that the skilled artisan will realize that where the specification refers to a “nanopore” different alternatives may use a “nanochannel” or “nanotube”. The only requirement is that the nanopore,

nanochannel or nanotube connect one fluid filled compartment to another and allow the passage and detection of labeled protein (see paragraph [0034]). Thus, this reads on claims 1, 7, 10, 11-13 and 16. The reference further teaches a method for analyzing a polymer of linked units comprising moving a plurality of individual units of a polymer of linked units through a channel and exposing the plurality of individual units to an agent selected from the group consisting of electromagnetic radiation, a quenching source and a fluorescence excitation source as the units move past the agent, individual units interacting with the agent to produce a detectable signal within the channel or at the edge of the channel (see Claims 1-4). This further reads on claims 7 and 11-14. The reference teaches that the detected signals can be compared to a known pattern of signals characteristic of a known polymer to determine the relatedness of the polymer being analyzed to the known polymer and analysis may also involve measuring the length of time elapsed between detection of a first signal from the first unit and a second signal from a second unit. The time elapsed between the sequential detection of signals may indicate the distance between two units or the length of the polymer (see column 8, lines 36-47). Furthermore, the reference teaches that the method involves the steps of causing the polymer to pass linearly relative to a station, detecting a characteristic signal generated as each of the two individual units passes by the station, measuring the time elapsed between the signals measured, repeating steps for a plurality of similar polymers to produce a data set, and determining the distance between the two individual units based upon the information obtained from the plurality of similar polymers by analyzing the data set. Furthermore, the reference teaches that

nanochannel can be prepared by electroless deposition procedure which produces a metal fibril running the complete width of the polycarbonate template membrane. The membrane can also be produced such that both faces of the membrane are covered with thin metal films to produce a nanodisk electrode ensemble… This assembly is useful for examining changes in current as polymers flow through changes in conductance can be measured (see column 46, lines 15-20 and 24-26). As evidenced by the instant specification, "the sensor layers may comprise semiconductor material including, but not limited to, silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide, and/or metal-based compositions such as metals or metal oxides (see paragraph [0078] of instant specification US 2005/0282229 A1). In regards to claim 35, the instant specification does not define what a “sub-nanometer scale" is. Further, since the proteins, polypeptides or peptides are passing though nonochannels, it would inherently have nanometer scales. Furthermore, claim 35 does not further limit the active method steps of claim 1. Thus, this meets the limitations of claims 1, 4-5, 7-8, 10-14 and 16.

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

6. Claims 1, 4-5, 7-8, 10-14, 16 and 35 remain rejected under 35 U.S.C. 102(a) as being anticipated by Chan (US Patent No. 6,355,420).

7. The teachings of Chan ‘420 are described, *supra*.

Rejection-35 U.S.C. 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 1, 3-5, 7-8, 10-14, 16 and 35 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Chan (US Patent No. 6,210,896).

12. The teachings of Chan '896 are described supra. The difference between the reference and the instant application is that the reference does not teach obtaining one or more proteins, polypeptides or peptides from a biological sample.

13. However, it would have been obvious to one of ordinary skill in the art to try the method of obtaining the identity of the protein of any sample, including proteins from biological samples, by using the teachings of Chan '896. There is a reasonable expectation of success since the method and the analysis of the Chan patent works on any polymeric compounds, such as DNA, RNA, and proteins that are labeled with luminescent labels, fluorescent labels, phosphorescent labels, chemiluminescent labels…nuclear magnetic resonance labels…electron spin resonance labels…and are detected with a photodetector or with an electrical detector.

14. Claim 2, 6, 15 and 32-34 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Chan (US Patent No. 6,210,896) as applied to claims 1, 3-5, 7-8, 10-14, 16 and 35 above in view of Thompson et al (US Patent No. 5,324,637).

15. The teachings of Chan '896 are described supra. The difference between the reference and the instant claims are that the reference does not teach placing nucleic acid into at least one chamber, each chamber containing a different type of labeled amino acid, and producing one or more labeled proteins, polypeptides or peptides encoded by the template nucleic acid, and the amount of labeled amino acid present in each chamber.

16. However, Thompson et al teaches a method for coupling transcription and translation from DNA, wherein RNA is transcribed from DNA and RNA translates into protein (see abstract). The reference further teaches that if a radiolabeled amino acid is used in the coupled reaction, such as ^{35}S methionine or ^{3}H leucine, then the corresponding amino acid is left out of the amino acid mix…RNA polymerase, either SP6, T7 or T3 is then added (see column 8. lines 60-65). Furthermore, the reference teaches that another method of measuring the amount of protein produced in coupled in vitro transcription and translation reactions is to perform the reactions using a known quantity of radiolabeled amino acid such as ^{35}S methionine or ^{3}H leucine and subsequently measuring the amount of radiolabeled amino acid incorporated into the newly translated protein (see column 11, lines 40-46). In regards to claims 32-34, these do not recite active method steps. These method steps are past tense, therefore, the method steps have already occurred. Therefore, when the proteins, polypeptides or peptides are present, this reads on claims 32-34. Further, it does not matter how the proteins are made, since it is still a protein.

17. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Chan ‘896 patent and Thompson et al patent to obtain the protein identity, because both prior art references teach the identification of proteins, using labeling of the protein such as fluorescence labeling, radiolabeling of proteins (Chan) and radiolabeling of proteins (Thompson) to quantify and identify the proteins. There is a reasonable expectation of success, since Thompson et al provide a simple method for producing protein from a template DNA, such a method which can be used

to couple transcription and translation of a single protein coded by the DNA template (see Thompson et al, column 4, lines 13-20). Furthermore, both prior arts teach radiolabeling of proteins to measure the amounts of labeling and Chan teaches limiting the region of detection of the polymer where the radiolabel exists on the protein.

18. It has been held that under KSR that "obvious to try" may be an appropriate test under 103. The Supreme Court stated in KSR, When there is motivation "to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103." *KSR Int'l Co. v. Teleflex Inc.*, 127 S. Ct. 1727,_,82 USPQ2d 1385, 1397 (2007).

19. The "problem" facing those in the art was that sequencing polymer methods are slow and labor intensive. For example, Sanger method involves the enzymatic synthesis of DNA molecules terminating in dideoxynucleotides, and subsequent analysis yields information of the length of the DNA molecules and the nucleotide at which each molecule terminates, and thus, the DNA sequence can be determined. The other method is Maxam and Gilbert method, which uses chemical degradation to generate a population of molecules degraded at certain positions of the target DNA, and with knowledge of the cleavage specificities of the chemical reactions and the lengths of the fragments, the NDA sequence is generated (see Chan patent '896, column 1, lines 32-47) and each process takes about 1-3 days, and there were a limited number of

methodologies available to do so, for example radiolabeling the protein sequence, DNA sequencing, mass spectroscopy and ELIDA sequencing. The skilled artisan would have had reason to try these methodologies with the reasonable expectation that at least one would be successful. In this case, Chan patent teaches that any polymer sequence can be labeled and run through the nanochannel, and the distance of each polymeric sequence can be read separately, for any DNA and protein sequences. Thus, performing a transcription coupled translation a radiolabeling the protein that is translated from RNA is a "the product not of innovation but of ordinary skill and common sense," leading to the conclusion that invention is not patentable as it would have been obvious.

(10) Response to Argument

20. Appellant argues that "the Examiner's interpretation of paragraph [0067] or [0078] of published application is incorrect. The Examiner has interpreted of paragraph [0067] of the specification to define "semiconductor" as including "metal-based compositions such as metals or metal oxides. The quoted sentence, however, describes various sensor layer compositions, it does not define "semiconductor." Appellant argues that "paragraph [0067] of the specification teaches multiple embodiments comprising different sensor layers including: (1) sensor layers comprising a semiconductor and/or (2) sensor layers comprising metals or metal oxides." Appellant argues that "semiconductor and metals are fundamentally different…Semiconductors and insulators have a band gap between the balance and conduction bands, with

semiconductors having smaller band gaps relative to insulators…Metals, in contrast do not have a band gap…One of ordinary skill in the art would recognize that metal covered sensor layer is not the same as a semiconductor covered sensor layer."

In regards to 35 U.S.C. 103(a) rejection, Appellant argues that "neither Chan '896 nor Chan '420 teach "passing the labeled proteins, polypepitdes or peptides through one or more nanopores, an inner surface of the nanopores coated with a semiconductor material. Thompson was merely cited for teaching a method for coupling transcription and translation from DNA, wherein RNA is transcribed from DNA and RNA translates into protein." Appellant argues that "Thompson does not even teach the use of nanopore sensors. Even if Chan '896 or Chan '420 were combined with Thompson, the resulting method would not include "passing the labeled proteins, polypeptides or peptides through one or more nanopores, an inner surface of the nanopores coated with a semiconductor material as recited in independent claim 1. Thus no combination of Chan '896, Chan '420 and/or Thompson would have rendered claims 1-8, 10-16 and 32-35 obvious to one of ordinary skill in the art at the time of invention."

21. Appellant's arguments have been fully considered but have not been found persuasive. Both cited references teach all of the active method steps of the instant claims. Chan '896 teaches that polymer is pulled closer to tip using dielectric forces created by applying an AC field to electrode and waveguide, i.e., metal layers, in addition to the DC field applied across wires. In regards to Appellant's argument that "Semiconductors and insulators have a band gap between the valence and conduction bands, with semiconductors having small band gaps relative to insulators. Metal, in

contrast do not have a band gap…the application of an electric field to a metal does not change the fundamental properties of the metal or convert the metal into a semiconductor," all of the elements of the semiconductor material is disclosed by Chan '896. The instant claim recites, "...coated with a semiconductor material." Appellant's specification (published PG Pub 2005/0282229 A1) was utilized to define what a "semiconductor material" is. The instant specification was used to identify what the property of what a semiconductor was. Appellant's specification was utilized to explain or define the properties of semiconductor material. As evidenced by the instant specification, "the sensor layers may comprise semiconductor material including, but not limited to, silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide, **and/or** metal-based compositions such as metals or metal oxides (see paragraph [0078] of instant specification US 2005/0282229 A1). The Appellant's specification explicitly describes that the "sensor layers may comprise semiconductor materials, including, but not limited to, silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide, and/or metal-based compositions such as metals or metal oxides." The specification uses the conjunction "and/or". This implies that semiconductor materials include silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide and metal-based compositions. If the Appellant wanted to clearly define that semiconductor material excluded metal-based compositions, the specification would have recited "or" only, to clearly delineate that metal-based compositions are not semiconductors. Additionally, both germanium and gallinium are metal based compositions. Furthermore, it is well known in the art that metal is a known semiconductors. Most metals are

semiconductors in some capacity. Therefore, the semiconductor material includes metal-based compositions, and Chan '896 teaching the metal layer would inherently have all of the properties of semiconductor material of instant claims. Therefore, Chan '896 as a whole anticipates all of the active method steps of the claimed invention of instant claims.

Chan patent '420 teaches all of the active method steps of the instant claims. Further, all of the components are disclosed in the Chan reference. Chan '420 also teaches that nanochannel can be prepared by electroless deposition procedure which produces a metal fibril running the complete width of the polycarbonate template membrane. The membrane can also be produced such that both faces of the membrane are covered with thin metal films to produce a nanodisk electrode ensemble… This assembly is useful for examining changes in current as polymers flow through changes in conductance can be measured (see column 46, lines 15-20 and 24-26). Again, the instant claim recites, "...coated with a semiconductor material." Appellant's specification (published PG Pub 2005/0282229 A1) was utilized to define what a "semiconductor material" is. The instant specification was used to identify what the property of what a semiconductor was. Appellant's specification was utilized to explain or define the properties of semiconductor material. As evidenced by the instant specification, "the sensor layers may comprise semiconductor material including, but not limited to, silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide, and/or metal-based compositions such as metals or metal oxides (see paragraph [0078] of instant specification US 2005/0282229 A1). The Appellant's specification explicitly

describes that the "sensor layers may comprise semiconductor materials, including, but not limited to, silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide, and/or metal-based compositions such as metals or metal oxides." The specification uses the conjunction "and/or". This implies that semiconductor materials include silicon, silicon dioxide, silicon nitride, germanium, gallinium arsenide and metal-based compositions. If the Appellant wanted to clearly define that semiconductor material excluded metal-based compositions, the specification would have recited "or" only, to clearly delineate that metal-based compositions are not semiconductors. Furthermore, it is well known in the art that metal is a known semiconductors. Additionally, both germanium and gallinium are metal based compositions. Most metals are semiconductors in some capacity. Therefore, the semiconductor material includes metal-based compositions, and Chan '420 teaching the metal films would inherently have all of the properties of semiconductor material of instant claims. Therefore, Chan '420 as a whole anticipates the claimed invention of the instant claims.

In regards to the 35 U.S.C. 103(a) rejections, both Chan '896 and '420 teach passing the proteins through one or more nanopores, an inner surface of the nanopores coated with a semiconductor material, as described, *supra*. As described above, Chan reference as a whole teaches the active method steps of instant claims. Chan '896 teaches that polymer is pulled closer to tip using dielectric forces created by applying an AC field to electrode and waveguide, i.e., metal layers, in addition to the DC field applied across wires. The active method steps of claim 1 are a) placing a plurality of labeled proteins, polypeptides or peptides in a plurality of chambers, b) passing the

labeled proteins, polypeptides or peptides through one or more nanopores, c) detecting labeled amino acid residues in the labeled proteins, polypeptides or peptides, and d) compiling an amino acid distance map for each type of labeled amino acid. Step 2) is a mental process, which does not involve any active method steps. In regards to the inner surface of the nanopores coated with a semiconductor material, this is not an active method step. This is a property of the nanopore, and the "coated" implies that the method step already occurred, and is no longer an active method step. Furthermore, it is well known in the art that metal is a known semiconductors. Most metals are semiconductors in some capacity. Additionally, both germanium and gallinium (specified as semiconductor material) are metal based compositions. Therefore, Chan '896 teaches the active method steps and components of the instant claims 1, 3-5, 7-8, 10-14, 16 and 35. Chan does not teach nucleic acid into at least one chamber, each chamber containing a different type of labeled amino acid, and producing one or more labeled proteins, polypeptides or peptides encoded by the template nucleic acid, and the amount of labeled amino acid present in each chamber.

However, Thompson reference teaches that another method of measuring the amount of protein produced in coupled in vitro transcription and translation reactions is to perform the reactions using a known quantity of radiolabeled amino acid such as ^{35}S methionine or ^{3}H leucine and subsequently measuring the amount of radiolabeled amino acid incorporated into the newly translated protein (see column 11, lines 40-46). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Chan '896 patent and Thompson et al patent to obtain the protein identity,

because both prior art references teach the identification of proteins, using labeling of the protein such as fluorescence labeling, radiolabeling of proteins (Chan) and radiolabeling of proteins (Thompson) to quantify and identify the proteins. There is a reasonable expectation of success, since Thompson et al provide a simple method for producing protein from a template DNA, such a method which can be used to couple transcription and translation of a single protein coded by the DNA template. As described in the KSR analysis, sequencing polymer methods are slow and labor intensive, each process taking about 1-3 days, and there were a limited number of methodologies available to do so, for example radiolabeling the protein sequence, DNA sequencing, mass spectroscopy and ELISA sequencing. The skilled artisan would have had reason to try these methodologies with the reasonable expectation that at least one would be successful. In this case, Chan '896 patent teaches that any polymer sequence or plurality of polymer sequences in multi-well can be labeled and run through the nanochannel, and the distance of each polymeric sequence can be read separately, for any DNA and protein sequences. Thus, performing a transcription coupled translation a radiolabeling the protein that is translated from RNA is a "the product not of innovation but of ordinary skill and common sense," leading to the conclusion that invention is not patentable as it would have been obvious. Therefore, the prior art references combined render the claims prima facie obvious.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Julie Ha/

Examiner, Art Unit 1654

Conferees:

/Cecilia Tsang/

Supervisory Patent Examiner, Art Unit 1654

/Michael G. Wityshyn/

Supervisory Patent Examiner, Art Unit 1651